

THE FAMILY GYRINIDAE (HEXAPODA: COLEOPTERA) IN NEW ZEALAND

With a description of a northern population

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Abstract. The Gyrinid species now known as *Gyrinus convexiusculus* Macleay, 1871, first described from Australia, was first discovered in New Zealand prior to 1873 by F.W. Hutton and a specimen was described as *Gyrinus huttoni* Pascoe, 1877. The locality given was Waikato, a large area north of the central plateau in the North Island. The same species of whirligig beetles was re-discovered in the Waikato, in lakes in Waipa Co., during the late 1970s. Both occurrences are discussed here and known specimens have been examined.

In early 1983 another population of the same species was found in Mangonui Co. at the northern end of the North I, in man-made 'dams' more than 350 km from the Waipa Co. lakes. This population was monitored from 1983 to early 1987 and again in 1988. The locality is described and the history of the area indicates the dams were most probably constructed in the early 1930s. Results of observations and collections are given.

Two specimens, found recently in the T. Broun collection, were collected in a third area on the northern east coast in Whangarei Co.

Published records and known specimens of the species in New Zealand are recorded and possible origins of the Waikato and northern populations are discussed.

The early history of the records and occurrences of the family Gyrinidae (whirligig beetles) in New Zealand has been sketched by Wise (1983). The only species was described by Pascoe (1877) as *Gyrinus huttoni* from one specimen collected in the Waikato area of the North Island (Fig. 1) by Captain F.W. Hutton. Ochs, in his revision of the Australian Gyrinidae (1949), treated this species as a synonym of the widely distributed *Gyrinus convexiusculus* Macleay, 1971 which he also recorded as the only species of *Gyrinus* in Australia.

Since the discovery in the late 1860s or early 1870s no Gyrinids were collected in the Waikato for over 100 years. Then, in the late 1970s Gyrinids were re-discovered in peaty lakes south of Hamilton, in Waipa County (Chapman 1982).

The discovery of another population of *Gyrinus convexiusculus*, in the far north of the North Island (Mangonui County) was also reported by Wise (1983) and the results of subsequent monitoring were presented at the XXIII SIL Congress in Hamilton, New Zealand, in early 1987 (Wise 1987).

The research and results on which that paper was based are described here in greater detail together with more information on earlier specimens, occurrences and records, and with additional information on *G. convexiusculus* gained in 1988-1989.

TWO UNSUPPORTED RECORDS

In the scientific results of the Austrian Novara Expedition, Redtenbacher (1868) recorded *Gyrinus striolatus* Guérin, 1830 from "Sidney und Auckland" (1868:24) and "Neu-Seeland" (1868:225) but it is considered that Auckland was an error in labelling or recording. There is no other evidence for this species [now *Macrogyrus striolatus* (Guérin-Ménéville, 1830)], which is the largest (ca. 15-18 mm in length) in Australia, occurring in New Zealand or for any Gyrinids being taken at Auckland.

The inclusion of *Gyrinus striolatus* by Hutton in his list of species recorded in New Zealand before 1870 (1874:160) could have been based on Redtenbacher's record and not on any specimens known to him.

Another record, since discredited, is that of *Dineutes australis* [for *Dineutus australis* (Fab., 1775)] in New Zealand by Régimbart (1882:422) followed by Régimbart (1892, 1902) and Ahlwarth (1910). The record of this Australian species (which is ca. 6.5-9 mm in length) for New Zealand was considered doubtful by Ochs (1949:193) and is not accepted here.

THE WAIKATO POPULATION

Historical records

F. W. Hutton (1873) recorded Gyrinids as one of four species of water beetles in New Zealand, under the name of *Gyrinus natator* (of "Britain"), which suggests that he had sighted Gyrinids here by the early 1870s.

This record by Hutton (1873) is here considered to be based on specimens, for which he used the name of a small European species known to him [*G. natator* (L., 1758), ca. 4.5-6.1 mm in length], in contrast to his later record (1874) based on an earlier publication (see above).

Captain F. W. Hutton (1836-1905) came to New Zealand about 1866 and by the time of his death was respected both as a geologist and a zoologist (Anon. 1906). After his arrival he settled in the Waikato district, was appointed to the Geological Survey Department in the late 1860s and subsequently made a geological survey of the Lower Waikato district. A paper, read before the Auckland Institute in May 1871 (Hutton 1872), indicated that he was in the field there at least until April 1871. Thus it is established that Hutton had the opportunity, as well as the interest, to collect specimens of whirligig beetles somewhere in the Waikato, in the late 1860s or early 1870s.

The Waikato region (Fig. 1) is a large, wide valley area (or basin) which surrounds the lower (northern) two-thirds of the Waikato River in the North I. It includes several large swamps and many, mostly small, lakes.

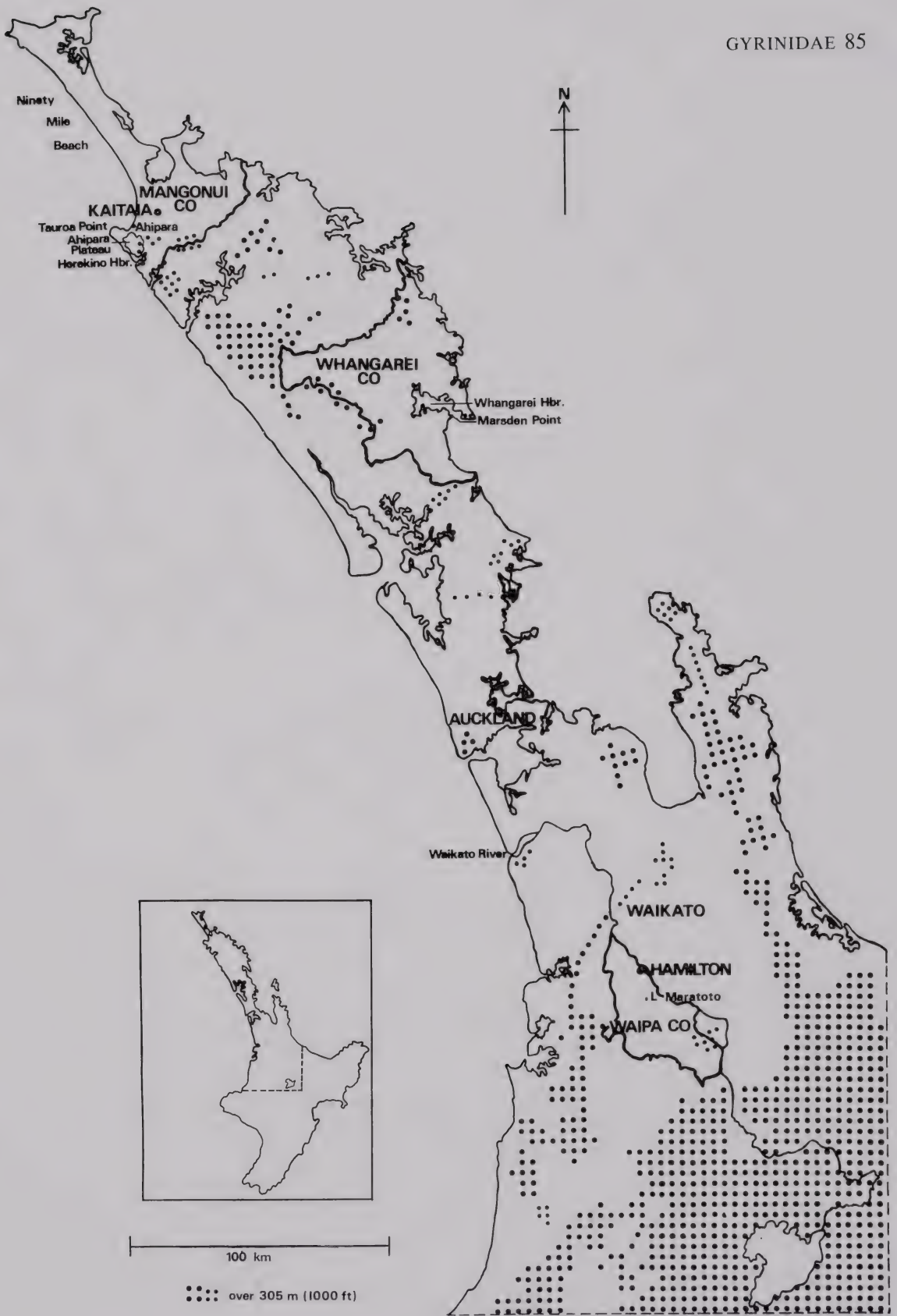


Fig. 1. Northern North I showing localities for Gyrinidae, and other mentioned features. Inset. North I, New Zealand.

Following Hutton's discovery, Gyrinids were not seen in the Waikato for more than a hundred years. Then in the late 1970s, during surveys by Waikato University biologists, the same species (now under the name of *Gyrinus convexiusculus*) was re-discovered there. The particular area was a group of 22 peaty lakes in the Waipa County, some 11-16 km south of Hamilton City (Fig. 1). J.A.T. Boubee and Dr. M.A. Chapman have advised (pers. comm.) that the first sighting of a Gyrinid beetle was at Lake Rotomanuka South in January or February 1977, with a possible sighting of whirligig beetles at L. Mangahia in early 1978, followed by beetle sightings at L. Maratoto in May, June (ca. 30 individuals), August and November 1979. In the last month two Gyrinid larvae were taken at L. Mangahia. Beetles were again seen at L. Maratoto in February and March 1980. Occurrences were where drains entered or exited the lakes, mostly in outlet drains, and only one beetle was seen on open lake water. Clearance of drains at L. Maratoto in late March 1980 caused the lake level to drop and Gyrinids were not seen there subsequently. Beetles taken in 1980 were lodged by M.A. Chapman in the National Museum, Wellington.

The presence of Gyrinids in the lakes was noted in a Limnological Society Newsletter as "whirligig beetles (*Gyrinus*, . . ." by Green, Chapman & Boubee (1979:42) and Green (1979:50). A further collection of three beetles was made by a group of visiting biologists at L. Maratoto in May 1979 and the species was recorded (Anon. 1979:44) as *Gyrinus convexiusculus* Macleay. These specimens were lodged in the Entomology Division, Auckland, by the entomologist in the group Dr T.K. Crosby.

Subsequently, the species was recorded and figured by Winterbourn & Gregson (1981) and Helmore (1982). The Waikato situation and the fauna of the Waipa Co. lakes, including *Gyrinus convexiusculus*, were recorded and discussed by Chapman (1982).

Waikato specimens

Two specimens from New Zealand, both labelled "Pascoe Coll.", were found by the author (in 1987) in the British Museum (Natural History) Entomology collections (BMNH). These are, presumably, both specimens originally collected by F.W. Hutton in the Waikato area.

It is not certain how many individuals were seen or collected by Waikato University biologists. Three specimens, taken at L. Maratoto in March 1980, were lodged in the National Museum (NMNZ) collection.

Three specimens collected by other biologists at L. Maratoto in May 1979 were lodged in Entomology Division collections (NZAC).

Sizes

Known specimens have been sexed and measured as follows.

Pascoe Collection (BMNH)	:	♀	4.5	mm
	:	♂	4.0	mm.
Waikato University collections (NMNZ) [in alcohol]	:	♂	4.4	mm
	:	♂	4.5	mm
	:	♀	4.7	mm.
Other collections (NZAC) [in alcohol]	:	♂	4.3	mm
	:	♂	4.4	mm
	:	♂	4.3	mm.

MARSDEN POINT

Two specimens of *Gyrinus convexiusculus*, labelled as from Marsden Point, have been found recently (1989) amongst mixed "Water Beetles" in the T. Broun collection in the British Museum (Natural History), following an enquiry by the present author.

Marsden Point (Fig. 1) is the southern point of the Whangarei Harbour entrance on the east coast of North Auckland in Whangarei County. It lies approximately 240 km northwards from the Waipa Co. lakes and some 140 km south-east of the Mangonui Co. population area.

It is meaningless to speculate on these specimens. As indicated in another paper (Wise 1988), Broun's labelling was not always accurate and did not include dates. Although he lived on the Whangarei Harbour from 1877 to 1879 (Wise 1988:149-150) and could have collected these specimens at Marsden Pt then, he did not record them in his *Manual* (Broun 1880) or any subsequent publication. He may, however, have collected them later and the locality record is accepted here.

Although Marsden Pt is known as a sandy beach area, the low flat terrain behind the sand-dunes could well have held freshwater ponds in days prior to Broun's death in 1919. There is now an oil refinery on Marsden Pt and drained farmland behind. During recent searches (winter 1989) the author has not seen Gyrinid beetles in temporary patches of water at Marsden Pt or in long-time permanent ponds further south at Ruakaka and Uretiti.

Incidentally, no Gyrinids have been found amongst pinned specimens of the E. Fairburn collection in the Northland Regional Museum, Whangarei, or in the E. Pritchard collection (AMNZ).

Sizes

The two specimens have been sexed and measured as follows.

Broun Collection (BMNH)	:	♀	4.8	mm
	:	♀	4.7	mm.

THE MANGONUI COUNTY POPULATION

In 1983 the present author found another population of *Gyrinus convexiusculus* in Mangonui Co. (Fig. 1) in the north of the North I (Wise 1983), more than 350 km from the area of the Waipa Co. lakes. This population has been monitored at irregular intervals until 1987 (Wise 1987) and again in 1988. It was still existing on 19 May 1989.

The northern locality

This locality for Gyrinids is on an exposed west coast low plateau south of Ahipara, a seaside area at the south end of Ninety Mile Beach, south-west of Kaitaia. The plateau, referred to here as Ahipara Plateau (known locally as "the gumlands"), lies south from Tauroa Pen. and in the north is faced by high sandhills which drop steeply to the sea beach. The plateau, itself, generally over 152 m (500 ft) high, extends to coastal cliffs further south and as far as steep cliffs overlooking the Herekino Harbour and is bounded inland by a narrow, steep-sided valley. It is dissected by stream valleys and is open rolling country ca. 183-244 m (ca. 600-800 ft) high in the north, more hilly to the south and east.

The site

The Gyrinid population occurs in open man-made ponds on the northern half of the Ahipara Plateau which was once covered by forests of kauri trees. Throughout the north, since last century, kauri gum has been collected from the ground previously occupied by such forests (Evans 1980, Hayward 1982). Gum-digging was a major occupation for large numbers of people, and trade and the economy were largely based on it. This trade continued into this century but has declined since the 1920s.

There was a surge of activity, however, in the early 1930s during the big economic depression when kauri gum digging was one of the many subsistence occupations which people took up at that time. Although in this particular area, where the Gyrinids were found, gum-digging was done last century, the peak activity was in the 1920s, when hundreds of gum-diggers were involved in sluicing the ground for gum (Hingley 1980, Hayward 1982:7,34). Long wooden aqueducts were built and ponds were dug for water storage prior to sluicing or washing. These ponds, contained by earth banks, were known as 'dams' and some isolated dams still exist although the banks do not dam running water. Three of them hold water all the year round, the water arising from rainfall and seepage, and it is in these that the Gyrinids occur.

All the information found by the author so far indicates that these particular dams were constructed no earlier than the 1920s and most probably in the early 1930s.

Dams

The first dam where Gyrinids were discovered is on a flat, open area surrounded by low tussock and scrub. This dam, known as Dam 1 (Figs. 2, 3), has open water with sedges in parts (vegetation had increased substantially in 1988). It is an elongate H-shape, each arm being at least 94 m long and the total area is ca. 1500 sq. m. The down-side bank is ca. 1 m high and the water depth is ca. 0.3-0.6 m deep.



Fig. 2. Dam 1. Northern arm looking inland.



Fig. 3. Dam 1. Southern arm looking towards coast.

The other two dams (known here as SE Dam and Hukatere Dam) are on sloping hillsides. Each has a downhill bank lying across the slope and being ca. 2 m high along its length. The water depth is greatest inside the bank and there is an area of sedges in the shallower uphill portion of the pond. Hukatere Dam (Figs. 4, 5) has an angled bank 77 m long which encloses a water area of ca. 800 sq. m, SE Dam is smaller.

Two of the dams are near each other and the third is ca. 2.5 km away.

Observations and collections (Tables 1, 2)

The area has been visited only from time to time as opportunity permitted but between February 1983 and January 1987 collections were made at least once in each month of the year so a composite picture could be built up in 1987. Further observations and collections were made every month from January to July 1988 and are included here. Most observations and collections were made in the northern arm of Dam 1 and all weather observations at one point on the northern side opposite the cross channel, ca. 216 m (ca. 710 ft) asl.

Weather

Weather observations were taken, as near as possible, at 12 noon Local time (New Zealand Standard Time) or Local Summer time (New Zealand Daylight Time). Whirling air temperatures ranged from 25.0°C (summer) to 14.5°C (winter). Water temperatures ranged from 24.0°C (summer) to 12.0°C (winter) during 1983-1987 and 28.0°C to 13.0°C in 1988. Winds, in general from 1983 to 1987, were northerly, mainly fresh to strong during spring to autumn and southerly, mainly light to fresh during winter. There were changes in winds during 1988. Cloud was mostly Cumulus throughout each year, often with rain clouds.

However, observation days were mostly finer days in order to see Gyrinid activity. Bad weather days were avoided so the weather observations do not indicate a complete range of conditions. Frequently the plateau is covered by low cloud and is subject to heavy rain showers.

Sightings

At first, observations of occurrences were noted only as few, several or many but later counts of numbers of whirligig beetles seen from one place in 60 (or 30) seconds were taken. The beetles have been seen in each month of the year but counts have been missed for August, September and November.

Counts

Highest counts (in 60 seconds) for summer were December — 22, January — 57, February — 51 and March — 42, but there were also counts of 45 in May and 41 in July. However, there were differences not shown by the counts, such as the 45 in May 1984 which were in one group with few others seen, whereas in summer months there were many others visible in the dam as well as those counted at one spot.



Fig. 4. Hukatere dam looking southwards from middle of earth bank, with hillside behind.



Fig. 5. Hukatere dam, southern end.

Table 1. Observations of Gyrinid beetles in Dam 1 and weather, 1983-1988.

Date	Beetles Sighted	Counted No. per seconds	Collected ♂♂ ♀♀	Weather Time*	Air temp. ca. 1m (whirling)	Water temp. ca. 15cm deep	Wind	Cloud†	Sun on site
16.II.1983	Few	1	3						
1.III.1983	Several	4	5						
2.III.1983	Few	1	1						
26.IV.1983	Several	6	2	1200L	20.5°C	17.0°C		10/10 As 3/10 Cu	
9.VIII.1983	Many	7	2						
10.VIII.1983	Many	1	—						
21.IX.1983	Several	6	3	1200L	17.0°C	17.0°C	NNW strong	8/10 As 5/10 straggly low Cu	
3.XI.1983	Many	9	10	1200LS (1100L)	20.0°C	20.0°C	NNW fresh	9/10 Sc straggly low Cu	
29.XI.1983	Several	3	2	1200LS (1100L)	19.0°C	20.0°C	SE —SSE fresh	4/10Cu	
30.XII.1983	Many in small groups	7/60 16/60 13/60 22/60	6 3	1200LS (1100L)	21.0°C	22.0°C	SE gusty fresh to light	1/10 Cu mostly on horizon, band to W over sea	Sun
1.II.1984	Many in groups	3/60 4/60 4/60 5/60 7/60 51/60	1 11	1200LS (1100L)			NE light	7/10 Cu	Sun
28.II.1984	Many — several groups over 50	20/30 49/30	16 36	1300LS (1200L)	25.0°C	23.0°C	NNE fresh	3/10 Cu	Sun
28.III.1984	Many in groups	11/60 30/60 42/60	10 17	1200L	21.0°C	21.0°C	NE fresh to strong	9/10 Cu Rain clouds about — slight shower	

Table 1. (Cont.)

Date	Beetles Sighted	Counted No. per seconds	Collected ♂♂ ♀♀	Weather Time*	Air temp. ca. 1 m (whirling)	Water temp. ca. 15cm deep	Wind	Cloud†	Sun on site
24.IV.1984	Several	6/60 7/60	4	— 1200L	19.5°C	18.0°C	NW light	1/10 Cu on horizon	Sun
29.V.1984	Few 1 group	45/60	2	1200L	15.0°C	13.5°C	S fresh	10/10 8/10 Cu + As	Sun
26.VI.1984	Many	15/30	4	1200L	16.0°C	12.0°C	Var — S light airs	7/10 Cu	Sun
24.VII.1984	Many	41/60	4	1200L	14.5°C	14.0°C	S light to fresh	9/10 7/10 Cu + high Sc or Ac	
16.X.1986		11/60	2	1200L	18.0°C	19.0°C	NW fresh	9/10 Cu, Sc	
		6/60					Shower in ½ hour before		
2.I.1987	Many	30/60 57/60	24	1210LS (1110L)	21.5°C	23.0°C	ENE fresh	8/10 Cu	Sun
				1310LS (1210L)	23.5°C	24.0°C	SE fresh	4/8 Cu 2/8 Ci	
15.I.1988	Few		4	1300LS (1200L)	24.0°C	25.5°C	SE gusty fresh	8/10 Cu	Sun
8.II.1988	Few	8/30	1	1300LS (1200L)	25.0°C	28.0°C	S light variable	4/10 Cu	Sun
26.III.1988	Few 1 group	28/30	3	1200L	22.0°C	20.0°C	S fresh	5/10 Cu + Ac	Sun
14.IV.1988	Several		2	1415L	17.0°C	18.0°C	NE very light	10/10 Overcast + Cu to N Lighter break to NE Light rain	Sun
18.V.1988	Several	20/60	2	1204L	19.0°C	16.0°C	NW light variable	10/10 Cb	
28.VI.1988	Several	20/60	3	1200L	16.0°C	13.5°C	SW light variable	6/10 5/10 Cu 1/10 Ci to NW	Sun
19.VII.1988	Several		4	1200L	16.0°C	13.0°C	S light variable	4/10 3/10 Cu 1/10 Ci to N	Sun

*L - Local. N.Z. Standard Time.

LS - Summer. N.Z. Daylight Time.

†Standard abbreviations: Cu-Cumulus, As-Altostratus, Sc-Stratocumulus, Ci-Cirrus, Cb-Cumulonimbus.

Table 2. Observations of Gyrinid beetles in hillside dams and weather, 1984-1987.

Date	Beetles Sighted	Counted	No. per seconds	Collected	Weather Time*	Air temp. ca. 1m (whirling)	Water temp. ca. 15cm deep	Wind	Cloud†	Sun on site
1.II.1984	Many	2	11							
1.III.1984	Few	4								
26.VI.1984	Few	1								
21.1987	Many	55/60	5	6	1130LS (1030L)	23.0°C	20.5°C	NNE fresh	7/10 Cu	Partial sun
SE DAM										
24.IV.1984	Few									
26.VI.1984	Nil									
21.1987	20 in whole dam	1	4							

*L - Local, N.Z. Standard Time.

LS - Summer, N.Z. Daylight Time.

†Standard abbreviations: Cu-Cumulus, As-Altostratus, Sc-Stratocumulus, Ci-Cirrus, Cb-Cumulonimbus.

Collections

Collecting was tentative at first as it was recognised that this could be a very fragile population. Later, after more beetles were found, collecting reflected the population to a degree as more were taken when more were present. Again in 1988, because of increased vegetation, the population in Dam 1 was considered to be threatened and collecting was reduced. Gyrinid beetles have been collected in each month of the year. Highest numbers taken were summer collections, January — 44, February — 52 and March — 27. In the remaining months less than 20 were taken in each month with the lowest numbers in winter and spring.

Although searched for many times by netting in the water and examining bottom and bank-side samples, only one immature was collected. This was a well-grown larva taken in the month of December.

Swarming

On two occasions a mass of active whirligig beetles was seen on the surface of the water. Each time, the occurrence was in a small shallow “bay” at the end of a dam and the beetles were more or less packed against the shore where they caused a flurry of water.

On 1 February 1984, when Hukatere dam was found, numerous beetles in a mass were noted at the southerly end. On 28 February 1984, there were large numbers of very active beetles in both arms of Dam 1. In the southern arm there were several groups over 50 in the eastern end (sheltered from the easterly wind) and a large group noted as “probably several hundred” in a bay at the end.

The nature of these swarms was not discovered at the time. Amongst possibilities there are physical factors, such as wind (either wind-blown or wind-sheltered) or water temperatures, or behavioural factors such as taking advantage of a food supply or mating. Perhaps the last is most likely.

Sex ratio

All specimens of Gyrinid beetles taken have been sexed (by the form of the fore tarsi) and measured (except a very few which were damaged in some respect). Both sexes were present in every month.

In almost 300 specimens from Dam 1 the sex ratio was 45.3% males: 54.7% females. Monthly ratios varied considerably, sometimes more males than females sometimes less. One January collection was 24 males to 20 females and one February collection 16 males to 36 females.

Sizes

Measurements were taken on the mid line from the posterior end of the elytra to the anterior margin of the labrum, which may be more or less flexed. Even so, the measurements indicate that the northern New Zealand population is noticeably larger than the size range given by Ochs for *Gyrinus convexiusculus* which was 3.5 - 4.75 mm.

The overall size range of pinned specimens in the Dam 1 population is 4.2 - 5.2 mm.; specimens in alcohol can extend further. There is also a distinct bimodal range for the two sexes. Males measure 4.2 - 4.6 mm and females 4.7 - 5.2 mm, except for a female taken in April 1988 which is 4.6 mm.

The northern specimens overall are larger than the Waikato specimens (see above) which also show a bimodal range, males 4.3 - 4.5 mm and females 4.5 - 4.7 mm.

Identification

This Gyrinid traces to *Gyrinus convexiusculus* Macleay, 1871 in Ochs revision of the Australian Gyrinids but the size ranges given above indicate that individuals are distinctly larger, which may be due to food supply and/or climate.

Fauna

Whirligig beetles in the northern dams are part of a highly predatory population of aquatic insects. There are other aquatic beetles, dragonfly and damselfly nymphs, backswimmers and water boatmen. On the surface there are scavenging pond skaters and water measurers. A dense population of midge larvae in the bottom mud is presumably the main base of the food chain, and there are also other fly larvae, caddis and crustacea present.

Occurrence elsewhere

During the 1983-87 period, streams and temporary pools on the local plateau area were particularly searched for Gyrinids, as were accessible lakes and ponds to the north, without success. These easily seen whirligig beetles were also looked for during general aquatic insect collecting in the Mangonui Co. and in other places both north and south of Auckland.

It was not until 19 May 1988 that one male *Gyrinus convexiusculus* was seen and collected ca. 35 km north of the Ahipara Plateau site. This individual was in an artificial plastic-lined forestry pond which contained a small population of other aquatic insects. The pond appeared to have been constructed in recent years (beside an old abandoned pond) and is one of many in the extensive pine forest planted some thirty years ago. It had been examined for aquatics, by the author, several times since January, 1988. The whirligig beetle occurrence suggests recent local movement of the species but could be an influx from another area.

NOMENCLATURE

A taxonomic list of synonyms is given for *Gyrinus convexiusculus* by Ochs (1949), the list given here is of New Zealand related records.

This species was described from Australia by Macleay (1871). Specimens were also found by Hutton, in the Waikato, New Zealand, who recorded the species as the European *G. natator* (Hutton 1873). He apparently also sent a specimen to Pascoe who described it (1877:141 "My specimen has . . .") as *Gyrinus huttoni*. Broun (1880) recorded the species under Pascoe's name and quoted Pascoe's description and comments, as did Régimbart (1886). *Gyrinus huttoni* was subsequently listed by Severin (1889), Régimbart (1892, 1902) and Hutton (1904).

Under the heading of *Gyrinus natator*, which was the first name used for the species in New Zealand (Hutton 1873), Régimbart (1907:171) accepted advice received from G.J. Arrow and synonymised *G. huttoni* of New Zealand with *G. convexiusculus*, thus recording the latter in this country. Ahlwarth (1910) placed *G. huttoni* as a synonym of *Gyrinus convexiusculus* but did not record the latter from New Zealand. Ochs (1949) included the synonymy and recorded *G. convexiusculus* from Australia, New Zealand and elsewhere.

Tillyard (1926), Hudson (1934) and Wise (1965) still recorded the species in New Zealand as *G. huttoni*. Since then, records are of *G. convexiusculus* by Wise (1973, 1983, 1987), McLellan (1975), Anon. (1979), Winterbourn & Gregson (1981), Chapman (1982) and Helmore (1982), except for two of *Gyrinus* by Green, Chapman & Boubee (1979) and Green (1979).

Abbreviations for collections

BMNH (Broun)	Broun Collection in British Museum (Natural History), London.
BMNH (Ent)	Main Entomology Collection in British Museum (Natural History), London.
NMNZ	National Museum of New Zealand, Wellington.
NZAC	New Zealand Arthropod Collection, Entomology Division, D.S.I.R. Auckland.

In view of the extensive collections recorded above (Tables 1, 2) it is not felt necessary to record here the specimens held in the Auckland Museum collection. All those specimens have been collected and identified by the present author; some will be lodged in other collections.

In the following specimen data, separate labels are indicated (by a stop and space) wherever possible and numbers of specimens are given in brackets.

Genus *Gyrinus* Geoffroy in Müller, 1764

Gyrinus Geoffroy in Müller, 1764, Fauna Insectorum Fridrichsdalina, xvii.

Gyrinus convexiusculus Macleay, 1871

- Gyrinus convexiusculus* Macleay, 1871, Trans. Ent. Soc. N.S.W. 2 (2, 3):128.
Gyrinus natator: Hutton, 1873, Trans. Proc. N.Z. Inst. 5:246 (NZ).
Gyrinus huttoni: Pascoe, 1877, Ann. Mag. Nat. Hist. (4) 19:141 (NZ).
Gyrinus huttoni: Broun, 1880, Manual New Zealand Coleoptera, 76 (NZ).
Gyrinus huttoni: Régimbart, 1886, Ann. Soc. Ent. France (6) 6:257, 271 (NZ).
Gyrinus huttoni: Severin, 1889, Ann. Soc. Ent. Belgique 33: 164 (Waikato).
Gyrinus huttoni: Régimbart, 1892, Ann. Soc. Ent. France 60:745 (NZ).
Gyrinus huttoni: Régimbart, 1902, Genera Insectorum Fasc. 1:8 (NZ).
Gyrinus huttoni: Hutton, 1904, Index faunae Novae Zealandiae, 151 (NZ).
Gyrinus convexiusculus: Régimbart, 1907, Ann. Soc. Ent. France 76:169, 171 (NZ).
Gyrinus huttoni: Régimbart, 1907, Ann. Soc. Ent. France 76:169, 171 (as syn.).
Gyrinus convexiusculus: Ahlwarth, 1910, Coleopterorum Catalogus 4, Pars 21:18.
Gyrinus huttoni: Ahlwarth, 1910, Coleopterorum Catalogus 4, Pars 21:18 (as syn.).
Gyrinus huttoni: Tillyard, 1926, Insects Australia New Zealand, 194 (NZ).
Gyrinus huttoni: Hudson, 1934, New Zealand beetles and larvae, 43, 179 (NZ).
Gyrinus convexiusculus: Ochs, 1949, Rec. Aust. Mus. 22(2):172 (NZ).
Gyrinus huttoni: Ochs, 1949, Rec. Aust. Mus. 22(2):172 (as syn.).
Gyrinus huttoni: Wise, 1965, Pacific Insects 7 (2):213 (NZ).
Gyrinus convexiusculus: Wise, 1973, Rec. Auckland Inst. Mus. 10:145, 156 (NZ).
Gyrinus convexiusculus: McLellan, 1975, Biogeography Ecology New Zealand, 557 (NZ).
Gyrinus sp.: Green, Chapman & Boubee, 1979, N.Z. Lim. Soc. Newsl. No. 15:42 (NZ).
Gyrinus convexiusculus: Anon, 1979, N.Z. Lim. Soc. Newsl. No. 15:44 (NZ).
Gyrinus sp.: Green, 1979, N.Z. Lim. Soc. Newsl. No. 15:50 (NZ).
Gyrinus convexiusculus: Winterbourn & Gregson, 1981, Bull. Ent. Soc. N.Z. 5:39, 43 (NZ).
Gyrinus convexiusculus: Chapman, 1982, N.Z. Ent. 7 (3):285 (NZ).
Gyrinus convexiusculus: Helmore, 1982, Bull. Ent. Soc. N.Z. 8:46 (NZ).
Gyrinus convexiusculus: Wise, 1983, Rec. Auckland Inst. Mus. 20:256 (NZ).
Gyrinus convexiusculus: Wise, 1987, Int. Assoc. Lim. Abstr., 138 (NZ).

BMNH (Ent). New Zeal. *Gyrinus huttoni*. Type. Pascoe Coll. 93-60 (1).

This must be the holotype specimen of *Gyrinus huttoni* (by monotypy) as Pascoe (1877) referred to only one specimen received from Captain Hutton. The type label is printed on red card. The Pascoe Collection label indicates the specimen was received in the BMNH collections in 1893.

New Zealand Pascoe Coll. *Gyrinus convexiusculus* Mcl. (1).

This is another early specimen, probably also received by Pascoe from the same source as the type. It may have reached the BMNH collections later indirectly from another source.

BMNH (Broun). Marsden Point. *Gyrinus huttoni*. 142. New Zealand Broun Coll. Brit. Mus. 1922-482 (1). Marsden. 142. New Zealand Broun Coll. Brit. Mus. 1922-482 (1).

The two locality labels and one determination label on the two specimens are in the same handwriting, believed to be Broun's. "142" is Broun's species number for *Gyrinus huttoni*.

NZAC. Lake Maratoto nr. Hamilton, drainage channel, 20 May 1979, M.A. Lewis & T.K. Crosby NZWO. *Gyrinus convexiusculus* Macleay det. T.K. Crosby May 1979 (3).

A further label on one specimen indicates it as the one illustrated by D.W. Helmore, 5 Dec. 1979 (see Helmore 1982).

NMNZ. Maratoto outlet, 14.3.80 M.A. Chapman & J.A.T. Boubee. *Gyrinus convexiusculus* Macleay Det. R.G. Ordish (3).

DISCUSSION

The Waikato population, first discovered in the late 1860s, or early 1870s, may have continued to the present day in the peaty lakes which are in an area possibly not investigated for aquatic insects much since Hutton's time. Although numbers seen since the late 1970s are very low there could be a level sufficient to keep the population going, allowing for movement between several lakes close together. This seems to be more likely than re-infestation from somewhere else, particularly as Chapman (1982) mentioned 22 lakes in Waipa Co. and over 50 in the Waikato Valley.

The recently found specimens from Marsden Pt. have added another dimension to the consideration of distribution and origin of the species in New Zealand. They apparently represent a population there prior to 1919.

The Mangonui Co. population appears to have occupied the present dams only since the early 1930s but there may have been natural ponds on the Ahipara Plateau previously. Further north, the one specimen was in an artificial pond in an afforested area.

The recent finds of specimens from Marsden Pt. and an individual in the far north, in addition to the populations in the Waipa Co. lakes and the Ahipara Plateau ponds, do suggest greater movement of Gyrinids either to or within New Zealand than previously suspected. In considering the origin of the Gyrinid populations in three areas of northern New Zealand there are the possibilities of them being long-standing or arising more recently from Australia.

Although Ochs, in his revision of Australian Gyrinids (1949), acknowledged that *Gyrinus convexiusculus* is a widespread species which may have migrated from the north to Australia, he particularly stated that the species could not have travelled long distances over the ocean. He postulated the necessity for use of an early Tertiary land bridge for distribution of this species to New Zealand.

The other possibility is that Gyrinid populations could have originated from Australia more recently. It is well-known that Australian insects do get blown across the Tasman Sea and birds are either blown or actively migrate. The North Island of New Zealand is ideally situated for wind-borne insects to land. Or could a bird, such as a wading Heron, Egret, Ibis or Spoonbill, have carried the species across the Tasman?

Further, establishment of a species requires survival of the first progeny. Perhaps new artificial ponds provide a comparatively safe habitat before the build-up of a predatory fauna.

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I should like to add that an error was made in my recent paper on tiger beetles (1988:178). In 1987, it was Dr Peter Hammond and other staff in the Coleoptera Section, British Museum (Natural History) Entomology, who assisted with access to the beetle collections and Dr Peter Barnard and other staff in the Neuroptera Section who gave access to Neuroptera and aquatic groups. In 1989, Dr Hammond and staff have kindly searched the T. Broun collection and sent the specimens found, on loan, at short notice.

Miss Rosemary Gilbert, Auckland Museum, has prepared Fig. 1 for publication.

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